propagation path along which light primarily travels within said light-guiding object, said light-guiding object including a material having an electron arrangement in which a population inversion may be caused by an energetic excitation and in which a stimulation by the light of said optical signals causes an induced emission of light at the same wavelength and in the same direction as that of the optical signals, the light of the optical signals being thereby amplified;

an excitation unit for emitting light to cause the population inversion in the material included in said light-guiding object;

a detector optically coupled to said light-guiding object for detecting light having the wavelength of the optical signals; and

a wavelength-selective element for filtering light emitted by said excitation unit from the light of the amplified optical signals to be detected by said detector;

wherein said light-guiding object is constructed of a material in which the light of the optical signals received through the radiation surface at angles of between 0 and 90 degrees relative to the irradiation surface is diffused such that the diffused light has a component along the propagation direction of said light-guiding object. ??

19. A method for processing optical signals, comprising the steps of:

providing a light-guiding object with a lateral irradiation surface for receiving optical signals adjacent to a propagation path along which light primarily travels within the light-guiding means, the light-guiding object including a material having an electron arrangement in which a population inversion may be caused by an energetic excitation and in which then a stimulation by the light of the optical signals causes an induced emission of light of the same wavelength and direction as that of the optical signals, the light of the optical signals being thereby amplified;

causing a population inversion in the material included in the light-guiding object using an excitation unit, and receiving an optical signal in the light-guiding object through the irradiation surface;

filtering with a wavelength-selective element the light of the excitation unit from the light of the optical signals which have been received by the light-guiding object and amplified by induced emission of the light-guiding object; and

detecting with a detector the amplified optical signals from which the light of the excitation unit has been filtered;

wherein the light-guiding object has been selected to be constructed of a material in which the light of the optical signals received through the radiation surface at angles of between 0 to 90 degrees relative to the irradiation surface is diffused such that the diffused light has a component along the propagation direction of the light-guiding object.

20. A method for processing optical signals according to claim 19, wherein a receiving device comprising the light-guiding object and a source of optical signals are mobile relative to each other such that the optical signals emitted by the source are received by the light-guiding object.

21. A method for receiving optical signals according to claim 19, wherein the light-guiding object is a stationary fiber-optical waveguide substantially shaped to form a ring and having a detector at one end, and the source of optical signals is disposed on a rotating element such that the emitted optical signals are continuously received by the light-guiding object during the rotation of the rotating element.

22. A method for receiving optical signals according to claim 19, wherein a detector is disposed at each end of the waveguide substantially shaped to form a ring, and the position of the source of optical signals is determined by measuring the signal transit times to each detector.

23. A method for receiving optical signals according to claim 19, wherein a detector is disposed at each end of the waveguide substantially shaped to form a ring, and the